

What is claimed is:

1.           A dual polarization transmission receiving  
2 system for canceling cross-polarization interference,  
3 comprising:

4           reception means including two RF local  
5 oscillators which receive signals transmitted by using  
6 two orthogonal polarized waves (V and H polarized waves)  
7 and convert the respective received signals into IF  
8 (Immediate Frequency) signals; and

9           demodulation means for branching each IF  
10 signal into two paths, and then demodulating the  
11 respective IF signals for each polarized wave by a  
12 digital coherent detection scheme, wherein

13           said demodulation means for each polarized  
14 wave extracts a phase noise component from a demodulated  
15 output signal, divides the component into DC and AC  
16 components, and suppresses a phase noise amount received  
17 from an RF local oscillator for an orthogonally  
18 polarized wave (different polarized wave) relative to a  
19 polarized wave (self polarized wave) as a compensation  
20 target in said demodulation means for each polarized  
21 wave by using a phase control signal obtained by  
22 interchanging the DC and AC components between the  
23 respective polarized waves.

2.           A system according to claim 1, wherein said

2 two RF local oscillators are synchronized at the same  
3 frequency by a common reference oscillator with a  
4 redundant arrangement.

3. A system according to claim 1, wherein said  
2 demodulation means extracts a phase noise component from  
3 a demodulated output signal, divides the component into  
4 DC and AC components, and generates the phase control  
5 signal by receiving an AC component from said  
6 demodulation means for the other polarized wave (V  
7 polarized wave or H polarized wave) and interchanging  
8 the AC components.

4. A system according to claim 1, wherein said  
2 demodulation means comprises:  
3 a common IF local oscillator which  
4 frequency-converts each of the branched IF signals;  
5 two A/D converters which convert the  
6 respective frequency-converted signals into digital  
7 signals;  
8 two demodulation circuits which demodulate the  
9 respective digital signals;  
10 an equalizer which equalizes a waveform of a  
11 demodulated signal of a self polarized wave as a  
12 compensation target;  
13 an XPIC (Cross-Polarization Interference  
14 Cancel r) which generates a replica signal of an

15   interferenc component from a different polariz d wave  
16   with respect to a demodulated signal on a different  
17   polarization side;  
18               an adder which outputs a demodulated signal by  
19   adding an error signal output from said equalizer and a  
20   replica signal output from said XPIC;  
21               a control circuit which generates an APC  
22   (Automatic Phase Control) signal corresponding to a  
23   shift of a carrier frequency from the demodulated  
24   signal;  
25               a divider which receives the APC signal output  
26   from said control circuit and divides the signal into DC  
27   and AC components; and  
28               a combiner which outputs the phase control  
29   signal obtained by interchanging the DC and AC  
30   components between the respective polarized waves.

5.           A system according to claim 4, wherein said  
2   demodulation means outputs the APC signal, output from  
3   said control circuit, to said demodulation circuit which  
4   demodulates a self polarized wave digital signal, and  
5   also outputs the phase control signal, obtained by  
6   combining a DC component output from said divider and an  
7   AC component output from said demodulation means for the  
8   other polarized wave (V polarized wave or H polarized  
9   wave), to said demodulation circuit which demodulates a  
10   different polariz d wav digital signal.

6.           A dual polarization transmission receiving  
2   system comprising:  
3           first and second RF (Radio Frequency) mixers  
4   which convert signals transmitted by using two  
5   orthogonal polarized waves (V polarized wave and H  
6   polarized wave) into IF (Immediate Frequency) signals;  
7           first and second RF local oscillators which  
8   are phase-controlled by a common reference signal;  
9           a common IF local oscillator and first and  
10   second IF mixers which branch each IF signal into two  
11   paths and perform digital coherent detection for each of  
12   the IF signals for each polarized wave;  
13           first and second A/D converters which convert  
14   the respective signals having undergone digital coherent  
15   detection into digital signals;  
16           first and second demodulation circuits which  
17   demodulate the respective converted signals;  
18           an equalizer which equalizes a waveform of a  
19   demodulated signal of a polarized wave (self polarized  
20   wave) as a compensation target;  
21           an XPIC (Cross-Polarization Interference  
22   Canceler) which generates a replica signal of an  
23   interference component from a different polarized wave  
24   with respect to a demodulated signal on a different  
25   polarization side relative to the self polarized wave;  
26           an adder which outputs a demodulated signal by

27 adding an error signal output from said equalizer to a  
28 replica signal output from said XPIC;  
29 a control circuit which generates an APC  
30 (Automatic Phase Control) signal corresponding to a  
31 shift of a carrier frequency from the demodulated signal  
32 and outputs the signal to said first demodulation  
33 circuit on the self polarization side;  
34 a divider which divides the APC signal into DC  
35 and AC components; and  
36 a combiner which generates a phase control  
37 signal by interchanging an AC component output from a  
38 divider for the other polarized wave between the two  
39 polarized waves, and outputs the signal to said second  
40 demodulation circuit on the different polarization side.

7. A local oscillator phase noise reduction  
2 method for a dual polarization transmission receiving  
3 system, comprising:  
4 the first step of converting signals  
5 transmitted by using two orthogonal polarized waves (V  
6 polarized wave and H polarized wave) into IF (Immediate  
7 Frequency) signals;  
8 the second step of branching each IF signal  
9 into two paths and then demodulating each of the IF  
10 signals for each polarized wave by a digital coherent  
11 detection scheme;  
12 the third step of extracting a phase noise

13 component from the demodulated output signal and  
14 dividing the component into DC and AC components;  
15 the fourth step of generating a phase control  
16 signal by receiving an AC component of the other  
17 polarized wave and interchanging the AC components  
18 between the two polarized waves; and  
19 the fifth step of generating a replica signal  
20 of an interference component from a different polarized  
21 wave for a demodulated signal on a different  
22 polarization side relative to a self polarized wave on  
23 the basis of the phase control signal in order to  
24 suppress a phase noise amount received from an  
25 orthogonally polarized wave (different polarized wave)  
26 relative to a polarized wave (self polarized wave) as a  
27 compensation target.

8. A method according to claim 7, wherein  
2 the second step includes:  
3 the step of frequency-converting each of the  
4 branched IF signals;  
5 the step of converting the respective  
6 frequency-converted signals into digital signals;  
7 the step of demodulating the respective  
8 digital signals;  
9 the step of performing waveform equalization  
10 of a demodulated signal of a self polarized wave as a  
11 compensation target;

12                   the step of generating a replica signal of an  
13 interference component from a different polarized wave  
14 with respect to a demodulated signal on a different  
15 polarization side; and  
16                   the step of outputting a demodulated signal by  
17 adding an error signal based on the waveform  
18 equalization and the replica signal, and  
19                   the third step includes:  
20                   the step of generating an APC (Automatic Phase  
21 Control) signal corresponding to a shift of a carrier  
22 frequency from the demodulated signal; and  
23                   the step of dividing the APC signal into DC  
24 and AC components.